

Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

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In the Matter of )  
 )  
An Allocation of Spectrum )  
For the Private Mobile Radio Services )

RM Docket No. 9267

Reply Comments of  
Six Meter FM Club of Crystal Lake, IL and Associated Repeater Trustees

The Six Meter FM Club of Crystal Lake and associated trustees operate repeaters and communications systems utilized for emergency communications as well as SKYWARN severe weather spotting in metropolitan Chicago, Northern Illinois, and Northwestern Indiana. Communicated herein are the combined comments of the combined membership and associates. Interest is limited to the proposed sharing of the 420 – 430 MHz and 440 – 450 MHz sub-bands of the 70 cm amateur allocation, with amateur operations proposed to be secondary to Private Mobile Radio Services (PMRS) as petitioned by the Land Mobile Communications Council (LMCC) and other supporting interests. Direct interest in the sub-bands of 420 – 430 MHz. and 440 – 450 MHz. includes primary repeater operation as well as control, voted receive site, linked communications services, high speed packet data back bone, and propagation research.

In reply to the comments of the LMCC, we wish to address many of their filed comments:

### **Comments Regarding Re-allocation of the 420/430 and 440/450 Sub-bands**

The LMCC suggests that the sub-band of 430 – 440 MHz. is utilized by amateurs for ‘emerging technologies’ such as television and satellite communications. In fact, this sub-band has been utilized for decades for these very purposes and continues to be used in these capacities. Examples include PacSat operations which allow delivery of electronic mail using satellites on a store and forward basis over the entire world. Amateur fast scan television has utilized the 420 – 440 MHz. sub-bands for over 4 decades. Space-based communications repeaters, such as the FM transponder on the MIR space station, and moonbounce also share this valuable spectrum. LMCC’s comments also suggested this spectrum is under-utilized. In fact, we as amateur operators, are experiencing a critical shortage of spectrum in these sub-bands in major metropolitan areas. Most major metropolitan coordinators have reduced repeater spacing requirements to ‘shoehorn’ more systems into the available spectrum. The primary usage of the 440 – 450 MHz. sub-band is conventional FM repeaters. In addition, this sub-band is also broken into additional specific-use parts, such as 440 – 441 MHz. and 445 – 447 MHz. which are utilized for duplex voice links, simplex communications, and packet data channels. Additionally, the 420 – 430 MHz. sub-band, where available, is also heavily utilized for simplex and duplex (with 3 MHz. offset) voice and data links. (In areas, such as the Canadian border region, where this sub-band has been unavailable, significant hardship is placed on the amateur community in establishing of alternative linking solutions.) These ancillary frequencies primarily service voted remote receiver site

linking. It is the redundancy of those receive sites, the intelligent voted linking of these sites, and capability to inter-connect repeaters through the use of full duplex link pairs that affords these amateur systems the robust, redundant communication capability during times of emergency or public service.

The SKYWARN system of linked repeaters in Illinois and the Cactus multi-state system of the Southwest are but two examples of these robust systems which have been constructed, maintained, and manned by amateur operators and public serviced-based groups such as RACES and ARES at no expense to the general public. Recreating such a system in the private or government sector would, indeed, place a huge burden on federal, state, and local government. There exists no commercial system which can provide this backbone of communications potential during an emergency situation, save, perhaps, military communications systems.

### **LMCC Comments Regarding Un-usable Spectral Allocations**

The LMCC indicates that many of the now-available spectral allocations are unusable for their purposes. For example, the VHF-LB spectrum is regarded as not usable due to poor building penetration, physically large antennas required, and propagation. The 11 year solar cycle may also limit the value of this spectrum for mobile and repeater service. Nonetheless, this band can be used for roles ranging from conventional point to point two-way radio, to short distance handheld operations irrespective of the inefficient helical

antennas which must be used. Further, the use of CCTSS squelch protection will limit noise bursts and nuisance unsquelching. The rapid growth of 46 / 49 MHz. CT-1 cordless telephone systems demonstrates the potential of this band for job site communications. With many of the low band paging systems now being abandoned, spectrum could be reallocated for other PMRS services, including repeaters based on 0.5, 1.0, and 1.7 MHz. offsets now used by the amateur radio service in the 6 meter band (50 – 54 MHz).

Likewise, the LMCC has rejected usage of the VHF high band spectrum due to the non-standard usage of repeater splits. Amateurs have adopted as a standard 0.6 MHz. offsets in the 144 – 148 MHz. Two meter allocation and public safety operators utilize offsets as low as 0.36 MHz. Thus, equipment currently exists for immediate implementation of said offset spacing.

Finally, the LMCC states that allocations above 2 GHz. are also not considered due to the current expense of equipment for these bands of operation. Amateur radio operators understand the cost of operation in new spectral allocations. The amateur radio community originally pioneered usage of the 420 band as it had for other spectral allocations before. As the equipment development costs were reduced, commercial product offerings increased, and the band became popular for PMRS usage. The same hold true for 800 and 900 MHz. services. Initially, the cost of equipment will be high for new allocations above 2 GHz., however, it is the free market economy and the incentive to build products at lower cost that ‘make the market.’

Migrating to higher frequencies actually has a number of benefits. Amateurs have utilized these benefits to our advantage for decades; the commercial services can and should do the same: A good example is that of the explosive growth of 800 and 900 MHz. systems. They are popular for a number of reasons including true line-of-site operations, very high gain with small antenna structures, and wide split frequency operations thereby eliminating the need for very complex cavity duplexers. As the frequency goes up, the ability to predictably define a coverage area also increases. Coupled with new digital modulation techniques and propagation modeling programs, very specific coverage contours may be defined. An excellent example of this is the OFDM (orthogonal frequency division multiplex) sound broadcasting system known as EUREKA-147 now being installed in Europe, Canada, and other world locations. Operating at 1.5 GHz., but defined as a system which can operate up to 3 GHz., the coverage contour of a broadcast facility is very precisely definable. The same can hold true for non-conventional digital commercial systems which could be developed to operate in the above-2 GHz spectrum. In addition, conventional FM systems may also be implemented at these frequencies, albeit at reduced spectral efficiency such as that encountered today. The question is not of technology as much as it is the unwillingness to design, establish standards, manufacture equipment to operate in these bands, and to rescind overly restrictive regulations to permit more liberal use of 12.5 and 6.25kHz. channels in the existing 451 – 455 and 456 – 470 MHz. PMRS allocations.

## **Broadband Data Communications**

The LMCC discusses the future needs of radio spectrum for broadband services. The amateur radio community is keenly aware of the needs for additional spectrum for these services. For example, the Illinois Repeater Association (IRA) recently voted in 1996 to de-coordinate amateur television (ATV) repeaters operating in the 420 – 430 and 430 – 440 sub-bands. The reason for this is two fold: 1) Advances in digital transmission of digital television allow equivalent quality to be sent in 1 MHz or less spectrum with an added level of robustness, 2) This spectrum is critically needed for additional voice and data links, weak signal communications such as satellite communications, and high speed data linking to the Internet, and 3) As amateurs we do not enjoy the hope of obtaining additional spectrum for these purposes. Rather, we contend with external threats and continuously improve our technique and become increasingly spectrally efficient.

The need for symmetric path, broadband services is a separate issue. High speed links are necessary for outgoing messaging, data, and even digital video applications. In usually, the return path (request for information from the mobile operator, for example) is generally at a much lower data rate. However, such asymmetric data paths can be addressed through various means, including leased channels and careful coordination. The commercial broadcast service can, for example, provide one-way, high speed data in the future by utilizing technology under development by consortiums such as United States Digital Radio (USADR). Primarily designed as a 300+kB/sec. data path for the conveyance of high quality audio to the listener, the broadcaster will soon realize that an

income stream will exist for the sale of the high speed data path for commercial services. PMRS can and should take advantage of that resource for outgoing data transmission. This is not unlike the current multiplexed subcarrier (SCA) channels now in use in FM broadcast with the exception that the data rate is at least two orders of magnitude higher in the new scenario. Such leased services could provide interim solutions for broadband data until new spectrum becomes available such as the channels 60 through 69 (slated for 2006) and 50 through 59 (slated for 2010).

Other broadband services should be allocated to frequencies above 2 GHz. Service providers exist today in the 2.4 GHz. band using Part 15 transmitters. If these minimum cost providers can utilize these band, there is no reason that commercial services can not be addressed in these higher frequency allocations as well. Likewise, new modulation techniques such as OFDM, which are being developed for data transmission use at frequencies up to 3 GHz., are particularly well suited for outgoing, high speed data services. Experimental systems are already in place and operational at L-band (1.5 GHz.) in Europe and Canada.

### **LMCC Spectral Requirement Demands**

The LMCC has requested a large amount of new spectrum totaling 125 MHz. Included in this need is an immediate need for 15 MHz. by 2000, 44 MHz. by 2004, and 125 by 2010. Also cited was a 1995 recommendation from the NTIA asking for 204 MHz. to be allocated, including 85 MHz. for Intelligent Transportation Systems (ITS). However, not

mentioned is the fact that the spectrum requested for ITS is to be allocated at 5.6 GHz. Furthermore, the dates seem to be carefully chosen to reduce the impact of the 24 MHz. already allocated to PMRS which is expected to occur due to the vacating of TV channels 60 – 69.

While the needs for PRMS are certainly valid, it is on the basis of servicing new users, not to efficiently use the spectrum required. Additional spectrum can be ‘obtained’ by speeding up the re-farming process and liberalization of restrictive and archaic rules. Currently, this is optional based on the operators / users passive desires. Such re-farming could be made mandatory, with an accelerated time-table. It could be suggested that the present time is correct to perform an acceleration of re-farming. For example, the transition from conventional FM radios by commercial users such as taxi and limousine as well private business operations such as tow trucks, commercial delivery trucks, and others to newer services which offer much higher spectral efficiency such as the Motorola IDen® system, Nextel, and PCS has taken off at what seems to be an exponential rate. As these services transition from conventional repeater to trunked selective coverage services, the spectral occupancy and sharing figures quoted by the LMCC come into question. The examples given in the Appendix of the LMCC comments are most likely dated and no longer accurately reflect the current situation. In addition, the LMCC comments ignore actual figures of T-Band usage, where it is available.



In Northeastern Illinois, one 6 MHz. channel is filled and based on the current rules, three TV stations in surrounding markets limit use of the second 6 MHz. channel.

Nonetheless, cooperation between PMRS proponents and the TV's has permitted sophisticated communications system operation in specific areas. While these channels required additional effort to resolve issues relevant to coverage and interference, it is possible to mutually exist in these shared channels where services are so vastly different. This is not the case in the 420 – 450 amateur allocation where services (modes of operation) are virtually identical.

The communications industry is changing rapidly. While the LMCC stipulates their needs, they do not take into account the transition of existing services; nor do they consider re-use of these vacated channels.

With specific regard to incidents concerning accidents caused due to interference on work channels as referenced to by the LMCC Comments, one must ask why CTCSS (analog or digital) did not prevent such mishaps. It is one thing to have a busy channel, but it is entirely different situation to have a job site improperly coordinated in matters of channel security. The same holds true for trunked operations. Finally, newer digital technologies which are emerging can all but eliminate such incidents or conflicts.

### **Possible Solutions to the LMCC 'Needs' for Spectrum**

While we believe that PMRS will need additional allocations to service the future needs of their customers, we do not feel that all potential solutions have been explored. The amateur radio community has a voice through the American Radio Relay League (ARRL), but compared to the lobbying effort which can be placed on the FCC and Congress by groups like the LMCC, we must rely upon the substantial and well documented record of service to maintain our current essential allocations.

We, as amateurs, can, however, suggest alternatives to the LMCC proposal. First and foremost, we suggest re-allocation of the 1390 – 1400, 1427 – 1432, and 1670 – 1675 GHz. sub-bands as soon as possible to PMRS services. This 20 MHz. will satisfy the LMCC identified needs for 15 MHz. by 2000. While new systems will need to be designed and marketed to utilize these allocations, RF sections have already been designed for PCS operations at 1.9GHz. Additionally, many companies have already designed and mass manufactured equipment for use at 1.5 GHz. for other world markets.

Additional allocations should be considered in the 960 – 1215 band. While considerable interference may be caused by and primary to services already in these bands and under development, commercial systems could be designed to reduce the effects of the current users of this spectrum (the Department of Defense). Amateur operators understand the effects of interference. We live with it and have found ways to operate despite the hardship. Examples of interference can be found by radar and other terrestrial services which affect usage of the 1240 – 1300 MHz. (23 cm), and 902 – 928 MHz. (33 cm) band

where we experience interference from commercial and Part 15 users. It is the severe interference issues in the 33 cm band which cause the amateur radio community to take issue with any plan to share the 420 – 450 MHz. (70 cm) band with commercial services such as PMRS. To date, the Illinois Repeater Association has declined to develop a bandplan for 33 cm due to this interference from external services.

Finally, there are other spectral allocations possibilities which should be addressed and issued quickly. The first is a speed-up of efforts to access the television spectrum. One method that would allow 6 MHz. wide blocks of spectrum to be freed up quickly in urban areas would be to allow low power television (LPTV) stations to ‘sublet’ their licenses for alternate usage. Most urban LPTV stations exist with one purpose in mind: Force the ‘must carry’ rules with local cable providers, thus getting their signal into many more homes than they normally would service with a level 5 signal. Alternate agreements could be forged with licensees of LPTV stations which would allow PMRS occupants to utilize the spectrum, while purchasing cable access and offering financial incentives to the stations for the use of the spectra. The issue is not unlike the use of T-band channels in some large markets today, except that the entire TV spectrum would be available based on LPTV protection criteria to existing full power television stations. Longer term, the LMCC should consider sharing of future DTV allocations to convey data to mobile customers in areas where no DTV stations are allocated. Of the 6 MHz. allocated to each TV channel in the DTV environment, only about 1 MHz. is required for each program channel containing NTSC quality video. The remaining ‘channel’ can convey large amount of broadcast data, perhaps on a leased or agreement basis.

Secondly, the various allocations of 230 – 403 should be re-visited. While there are certain taboo channels in this spectrum, such as tactical military and aircraft communications as well as ground to space communications (shuttle / manned space station), for the most part this vast amount of spectrum is allocated to AM transmission, with 6kHz total occupied bandwidth, on up to a 100 kHz channel spacing grid. While AM is utilized for air to air and ground to air communications due to the fact that a heterodyne can be easily heard, thus allowing communications without capture effect to take place, protection ratios and guard bands of this level are not necessary with current technology available (frequency stability, etc.). Sharing of this band should be re-considered.

Third, allocations at PCS frequencies should be reallocated to PMRS. Operation at 1.9 GHz. satisfies even the request of the LMCC to operate at under 2 GHz. This is especially relevant in light of the rapid decline in interest of PCS allocations and the steep decline in auction revenues.

Fourth, consideration to reduction of protection ratios, particularly in the 800, 900, and T-band operations should be re-considered. Amateurs routinely operate with 30, 45 and 60 mile spacings in the UHF spectrum while 800 MHz. systems have as much as twice this protection between channels, depending on the class of system. Many don't meet the minimums in real operation and should be down-graded. Others sold and are not correctly reflected in the data base.

Fifth, re-consideration should be given to opening up additional television channels for shared usage similar to that currently done at 470 – 512 MHz. (T-band). Consideration should be given to the sale or lease of spectrum in the UHF spectrum by current users.

Finally, re-farming should be sped up to take advantage of spectrum already allocated as mentioned elsewhere in this filing.

#### **Miscellaneous Concerns Over Spectrum Sharing in the 70 cm Band.**

Sharing of spectrum by amateurs with commercial services has historically resulted in amateurs being evicted from the affected channels. The 1991 order reducing our 1.25 meter allocation by 40% placed a significant burden on the amateur repeater service as well as data linking. A promise to share the 219 MHz. band for point to point data linking has taught us that sharing does not work well when we are secondary to commercial services: This band is all but unavailable to us in the urban areas where we need it the most. It is noteworthy that, while the LMCC discusses this former 1.25 meter allocation as a small help to their needs; it was an enormously huge disaster and loss for amateur operators. When it was later learned that this band would not service the need it was reallocated for, it should have been returned to amateur radio. Instead, it was slated for auction. To date, the reallocated band has many less users than when it had been allocated to amateur radio.

Similar problems occur on the 902 – 928 MHz (33 cm) band which had been allocated as primary to amateurs. While we still occupy the band on a secondary basis, we do so at the expense of interference by primary licensees. While this band was slated for a transition of 70 cm ATV to alleviate congesting in that band, it is no longer practical for use in many urban areas due to Part 15 devices owned by users not well versed in the rules.

Our one good example of sharing has been with the mutually symbiotic relationship with the military in the 70 cm band. While amateurs were once primary in the band, this was given up for the national interests during the cold war. Amateurs retain secondary rights on this band and the cooperative effort has remained collaborative for nearly 40 years. We have learned to accept the incidental interference which we may incur from military operations in this band and cease operations when necessary or requested, such as near the quiet zone at White Sands Missile Range or during exercises held at nearby bases. In exchange for continued use of this band, we provide a wealth of public service in the form of emergency communications and the like. We wish to continue this relationship in the 70 cm band and have pledged considerable investment both in actual equity and expended effort in it for the public good.

## **Services Provided by Amateur Radio in the 70 cm Band**

In conclusion, we would like to re-iterate the services provided by amateur radio in the 420 – 430 and 440 – 450 MHz. sub-bands requested for re-allocation by the LMCC. We wish to call light to and echo the response of the NTIA strongly urging that this band not be re-allocated from amateur service, even on a shared basis with the LMCC. They point out the 150,000 trained amateurs that make up the sophisticated SKYWARN networks nationwide. These frequencies are absolutely necessary to the continuance of this program, of which our groups are an integral part of. In addition, due to the diverse nature of the amateur radio system and the inherent redundancy and versatility within it, no commercial service can provide the level of emergency communications needs when other services are interrupted. While it is feasible that a commercial service could be devised to replace the amateur service, the cost and infrastructure would be enormous not to mention inherent liability and who will carry that burden. The public does not need such a burden placed upon it when a volunteer system, provided by amateur radio, is already in place. Other examples of emergency communications have been witnessed first hand by many citizens of the US. These include communications during earthquakes, floods, tornadoes, hurricanes, fire storms, and other disasters. We all hope that manmade strife or conflict never reaches our land, but amateurs prepare each year for this possibility as well through field day training during late June. Communications on a world wide basis is possible through our preparedness, but the backbone of VHF and UHF repeaters is key to the conveyance and handling of this information in a professional, trained method. It is, perhaps, for this reason that LMCC members, such as

APCO take exception to the attempted gutting of the amateur service by the LMCC proposal. We also echo the response of the National Weather Service in the NTIA filing. Finally, we urge the Commission to carefully review the comments of the ARRL. This long-standing voice of amateur radio in the United States has properly addressed the concerns of the amateur radio community on this issue and they have justified our continued, unimpeded needs in the 70 cm band. In that regard, our Reply Comments echo those of the ARRL in area not addressed herein.

Amateur radio operates, for the most part, on the donations of committed time, technical expertise, and money of those called to its ranks. Due in part to an understanding encouraged by the communities in which we operate, we are able to continue advancing our proficiency. Commercial operators graciously offer us tower space to make possible our primary communications systems adequately service our individual communities. Individuals maintain crucial backup systems that can be placed into operation at a moments notice with no restrictions.

Perhaps it is for these reasons that the late Barry Goldwater, a licensed ham for over 7 decades, said that amateur radio was not a hobby, but a necessary public service. We hope that the Commission recognizes this and rejects the attempts of the LMCC to obtain spectra that is so vital to our service and the public at large.



WHEREFORE, the premises considered, the Six Meter FM Club of Crystal Lake and associated interests, on behalf of all licensed United States Amateur Radio Operators request and petition the FCC to reject the petition of the LMCC to encroach upon the 70 cm band allocation now in use by the amateur radio community.

Respectfully submitted

Six Meter FM Club of  
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Associated Interested Parties

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